

**Four Port NODE
Ethernet to DMX Interface Configuration &
Owner's Manual**

model: NODE4



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Overview

The NODE4 is an Ethernet to DMX bridging device. It accepts Artistic License's Art-Net (version 3 or prior), PLASA's Streaming ACN (ANSI E1.31), draft sACN, KiNeT V1 (ColorKinetics), and ShowNet (Strand Lighting) protocols. There are four fully isolated DMX512 ports. Each port can be configured as either an input or as an output. Each of the connectors can be mounted on either the front or rear panel. Their location can be changed in the field to accommodate fixed or touring installations.

The factory default configuration covers most applications. An easy to use control panel gives access to all network settings if a change is needed. The backlit 2 line by 20 character LCD and LED indicators give quick status feedback.

To configure the NODE4 ports, choose what you want to set up by pressing the port or network adapter SELECT key. Use the arrow keys to find the option you want to change and press ENTER. Use the arrows to change the value and press ENTER again to save. You can use the BACK key at any time to disregard changes and return to the previous menu.

The NODE4 features a universal input power supply and a rugged enclosure. An optional rack mounting kit is available (model RK16-1). Holes are provided for truss mounting using a C-clamp or half-coupler.

DMX PORT SPECIFICATIONS

Port circuit:	EIA-485 transceiver with 120 ohm termination between Data+ and Data-
	NOTE: This product uses slew-rate-limited output drivers. Slew-rate-limited drivers minimize EMI and reduce reflections.
Input signal:	0.2 Volts minimum, 12 Volts maximum
Output signal:	1.5 Volts (minimum) into 120 Ohm Termination
Connectors:	Female Neutrik DL-series gold plated 5 pin XLR (standard female connectors, male on request)
Port protection:	+60V continuous, +15KV transient
Isolation:	600 Volts

ETHERNET SPECIFICATIONS

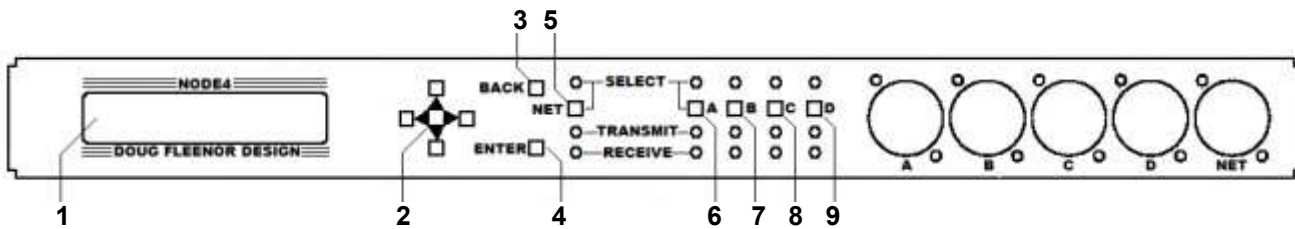
Ethernet circuit:	100BASE-TX Fast Ethernet, MDIX, and Auto Negotiation
Connector:	Neutrik Ethercon
Isolation:	1500 Volts

MAIN SPECIFICATIONS

Power input:	6W, 100 to 240 VAC 50/60 Hz
Color:	Top, bottom, and sides: Silver hammertone Front and back: Black
Size and weight:	1.7"H × 10.375"D × 16.5"W, 6 pounds

Setup and Operation

Front Panel User Interface



1) 20x2 Character LCD screen: Used to show data to the user based on the current selection. After power up, the display shows the unit's current name and IP address.

2) Direction Pad: Consists of **UP**, **DOWN**, **LEFT**, and **RIGHT** keys. Use these keys to edit configuration items and navigate the menu system.

3) BACK key: The BACK key is used to return to the HOME screen from one of the information screens or to exit an editing screen without saving the changes.

4) ENTER key: Used to edit the item you are currently viewing. When editing of a parameter is complete, press ENTER again to save the changes.

5) NET key: The NET key is used to enter the network settings menu. From there the DHCP mode, IP address, Subnet Mask, and network protocols can be changed. The MAC address can also be viewed.

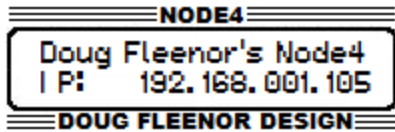
6,7,8,9) Keys A, B, C, and D: These keys are used to select the corresponding DMX512 port. In each port's menu, the universe and the port's input/output status can be edited. In addition, the levels of each DMX512 channel on the selected port can be viewed.

10) Front panel LEDs (not referenced on the diagram): The LEDs show the status of each of the NODE4 ports. When a port's **SELECT** button is pressed, the blue LED above that button illuminates to indicate that it is selected for viewing or editing. The green NET TRANSMIT LED flickers while the NODE4 is sending data out on the Ethernet port. The red NET RECEIVE LED flickers while the NODE4 is receiving data from the Ethernet port. Each of the DMX512 ports has a green TRANSMIT LED and a red RECEIVE LED. The TRANSMIT LED flickers while DMX512 data is being sent from the associated DMX512 port (output mode). The RECEIVE LED flickers while DMX512 data is being received on the associated port (input mode).

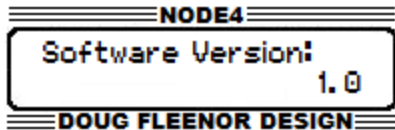
The rate at which each of the TRANSMIT and RECEIVE LEDs flickers provides additional diagnostic information. Each LED will change its state (on or off) when a new packet of data is transmitted or received. For example, if one of the DMX512 ports is configured as an input, the flickering RECEIVE LED will show the relative update rate of the incoming signal.

The Menu System

HOME Menu

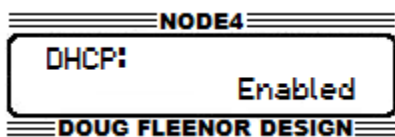


The **HOME** page shows the unit's name and current IP address. This is the default screen at startup, and you can return to it at any time by pressing the **BACK** key until you reach the HOME screen. Pressing the DOWN key from this page will display the Software Version page.



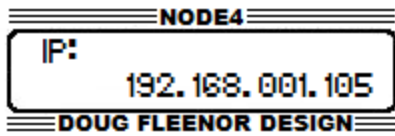
The **Software Version** page shows the unit's current software version. This page is located one page down from the **HOME** page.

NET Select Menu



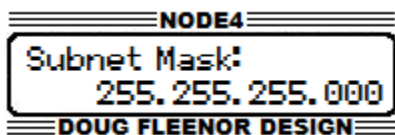
To **Enable/Disable DHCP** press the **NET** select key which will take you to the network select menu. The first page displayed is the DHCP Enable/Disable page. Press **ENTER** to enable editing. Use the **UP** or **DOWN** keys to select from Enable or Disable. When a final selection has been made, press **ENTER** to save the changes.

Press **BACK** to exit without saving.



To set the **IP Address** press the **NET** select key. This will display the network select menu. Press **DOWN** once. The IP Address page will be displayed. Press **ENTER** to begin editing the IP address. The IP address cannot be edited if DHCP is enabled. If DHCP is disabled, the **LEFT** and **RIGHT** arrow keys can be used

to select the digit to edit. Use the **UP** and **DOWN** arrow keys to change the selected digit. After editing all digits, press **ENTER** to save changes. Press **BACK** to exit without saving.



To set the **Subnet Mask**, press the **NET** select key. This will display the network settings menu. Press the **DOWN** arrow key twice to display the Subnet Mask page. Press **ENTER** to edit the Subnet Mask. The Subnet Mask cannot be edited if DHCP is enabled. The **UP** and **RIGHT** keys increase the number of ones in

the Subnet Mask. The **LEFT** and **DOWN** keys decrease the number of ones in the Subnet Mask. Configuring the Subnet Mask in this fashion is consistent with the CIDR notation (More information can be found by searching for CIDR online), and allows all valid Subnet Masks in the range from X.X.X.X/8 to X.X.X.X/24 or 255.0.0.0 to 255.255.255.0.

```
=====
NODE4
=====
MAC Address:
00:04:A3:56:2A:D3
=====
DOUG FLEENOR DESIGN
=====
```

To view the **Medium Access Control Address** (MAC Address), press the **NET** select key. This will display the network settings menu. Press the **DOWN** arrow key three times to display the MAC Address page. This value is not configurable.

```
=====
NODE4
=====
Network Protocol:
Streaming ACN
=====
DOUG FLEENOR DESIGN
=====
```

To set the **Network Protocol**, press the **NET** select key. This will display the network settings menu. Press the **DOWN** arrow key four times to display the Network Protocol Page. Press **ENTER** to edit the mode. Use the **UP** and **DOWN** arrow keys to cycle through the network protocols supported by the NODE4. Press **ENTER** to it is displayed. The NODE4 will save this setting and reboot. Press

select the desired protocol when **BACK** to exit without saving.

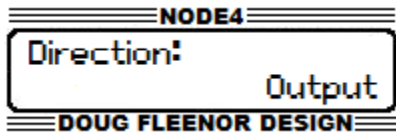
PORT Select Menu

```
=====
NODE4
=====
Universe:
1
=====
DOUG FLEENOR DESIGN
=====
```

To set the **Universe** for each DMX512 port, press the corresponding port key (**A**, **B**, **C**, or **D**) for the port to be configured. This displays the port settings menu. The first page in the port setting menu is the universe page. The current universe select for the selected port is displayed. Press **ENTER** to edit the universe number. Use the **LEFT** and **RIGHT** arrow keys to select the digit to edit. Use the **UP** and **DOWN** arrow keys to change the value of the digit. Press **ENTER** to save the value. Press **BACK** to exit without saving. When the NODE4 is in Art-Net mode, there are two more pages below the Universe page to configure the Art-Net Subnet and Art-Net Net. Use the same process to access and configure these entries.

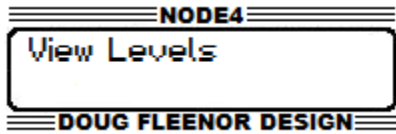
```
=====
NODE4
=====
Subnet:
03
=====
DOUG FLEENOR DESIGN
=====
```

```
=====
NODE4
=====
Net:
120
=====
DOUG FLEENOR DESIGN
=====
```

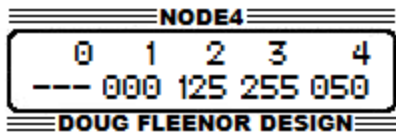


To change the **Direction** of a port press the corresponding port select key (**A, B, C, or D**) for the port to configured. Press **DOWN** one time (or three times when in Art-Net Mode) to display the Port Direction page. Press **ENTER** to edit the direction. Use the **UP** and **DOWN** arrow keys to select between Input and Output modes.

When the appropriate direction is displayed, press **ENTER** to save the settings. Press **BACK** to exit without saving.

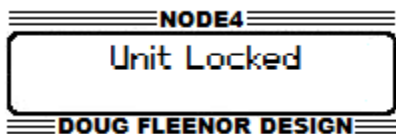


To view the **DMX Levels** of a port press the corresponding select key for that port (**A, B, C, or D**). Press the **DOWN** arrow key three times (or four times in Art-Net mode) to display the View Levels page. Press **ENTER** to view the current levels on the port. The values are shown as 0 – 255 (0 to Full). Pressing the **LEFT** or **RIGHT** arrow keys will scroll to view other channels. Pressing and holding the **LEFT** or **RIGHT** arrow keys scrolls through channels at a high rate. Press **BACK** to return to the View Channels page.



Locking and Unlocking the front panel is accomplished by navigating to the home (press **BACK**) screen and holding the **LEFT** and **RIGHT** arrow keys for 2 seconds. The NODE4 will display a locked message. Users may navigate the menu system but, editing is disabled. To unlock the unit, navigate back to the

home screen (press **BACK**). Press and hold the **LEFT** and **RIGHT** arrow keys for 2 seconds. The NODE4 will display an unlocked message and users will be allowed to edit the configuration. Note that locking the front panel does not disable web access.



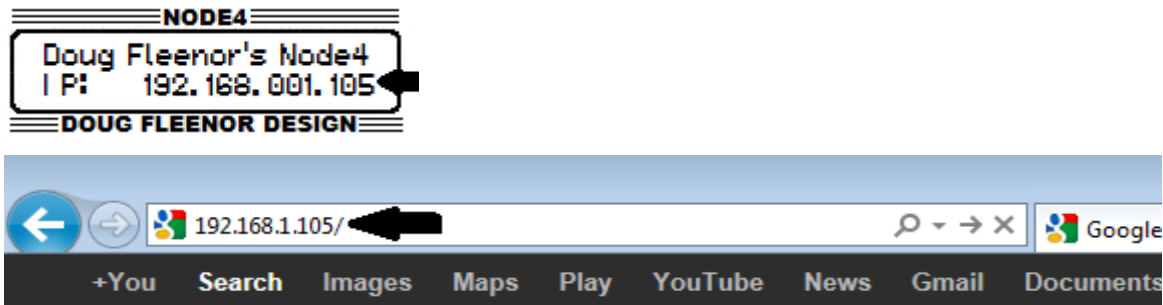
Using a web browser to configure the NODE4

The NODE4 has a built-in web server that allows remote configuration of a unit across the network. It allows for configuration of all aspects of the NODE4 including the front panel name, unit description, network settings, and port options available for the current network protocol.

To access the web server, the computer to be used must be physically connected to the same network as the NODE4. It must be in the same Subnet, have the same Subnet Mask, have a unique IP address, and have a web browser installed.

To start the web server, open a web browser (Internet Explorer, Mozilla Firefox, Google Chrome, Safari, etc....).

In the address bar of the browser, type in the IP address of the NODE4. The IP address of each NODE4 can be located on the HOME page of the device as shown in figure below. In this example the IP address of this NODE4 is 192.168.1.105. After this address has entered, press Enter on the computer keyboard. The **Status Page** from the NODE4 will be displayed.



On the **Status Page** the current status of the NODE4 can be seen. The uptime, number of power cycles, software version, DHCP status, IP address, Subnet Mask, MAC Address, DMX512 port Universe selections, and DMX512 port input/output status. A menu bar at the top of the page has links to access the network settings and the DMX512 port settings. In addition, there is a check box to identify the NODE4. While checked, the LCD backlight on the currently selected NODE4 will blink.

The screenshot shows the NODE4 web interface. At the top left is the 'NODE4' logo in yellow. A yellow navigation bar contains the following tabs: 'Status', 'Network Configuration', 'Port A', 'Port B', 'Port C', and 'Port D'. On the right side of this bar is the text 'Identify Node: '. The main content area is divided into three sections on the left: 'Identification', 'Network Status', and 'Port Status', each with a dotted line separator. The right side of the main area displays configuration details for the selected node.

Identification	Device Name: Doug Fleenor's Node4
	Description: Use this description text to identify the unit on the network
Network Status	DHCP: Enabled
	IP Address: 192.168.1.105
	Subnet Mask: 255.255.255.0
	MAC Address: 00:04:A3:56:2A:D3
Port Status	Network Protocol: Artnet v3
	Port A Direction: Output
	Port A Universe: 1
	Port A Subnet: 0
	Port A Net: 0

The **Network Configuration** page lets you set the Device Name, Description, IP Address, Subnet Mask, DHCP settings, and Network Protocol. Be sure to click the Save Settings button on the bottom right of the page before navigating away from this page. If another page is selected before saving, all changes will be lost. If the IP, Subnet, or DHCP settings have been changed, care must be taken to ensure it will still be possible to connect to the NODE4 after saving the settings. The NODE4 may reboot after saving your new settings.

NODE4

Identify Node:

Status Network Configuration Port A Port B Port C Port D

Identification

The *NODE4's* Device Name is the text displayed on the home screen. This can be used for easy identifying of particular units.

The Description is used to describe the *NODE4* to other nodes and controllers on the network.

IP Settings

DMX over Ethernet

Device Name:

Description:

DHCP:

IP Address: . . .

Subnet Mask: . . .

MAC Address: 00:04:A3:56:2A:D3

Network Protocol:

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Phone: (805)-281-9599

The **Port A**, **Port B**, **Port C**, and **Port D** pages allow setting of the attributes of the DMX512 ports. Be sure to click the Save Settings button before selecting another page.

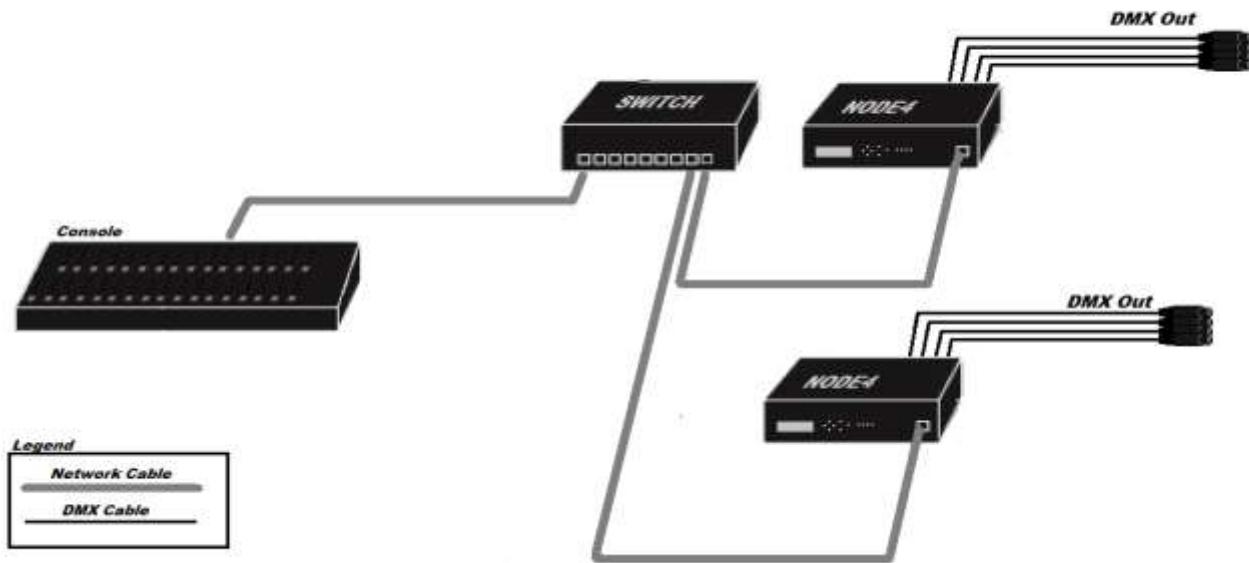
The screenshot displays the NODE4 web interface. At the top left is the logo "NODE4" in a bold, yellow, italicized font. Below the logo is a yellow navigation bar with the text "Identify Node: ". Underneath this bar is a secondary navigation bar with tabs for "Status", "Network Configuration", "Port A", "Port B", "Port C", and "Port D". The "Port A" tab is currently selected. The main content area is divided into two sections: a dark grey sidebar on the left with the heading "Port A" and a dotted line below it, and a light grey main area on the right. The main area contains the following configuration fields: "Direction:" with a dropdown menu set to "Output"; "Universe:" with a text input field containing "1" and "(0-15)" to its right; "Subnet:" with a text input field containing "0" and "(0-15)" to its right; and "Net:" with a text input field containing "0" and "(0-127)" to its right. A "Save Settings" button is located in the bottom right corner of the main area. At the bottom of the page, centered, is the copyright information: "Copyright © 2012 Doug Fleenor Design, Inc. Designed, Built, and Serviced in the United States Phone: (805)-281-9599".

Operation of the NODE4

Upon **Loss of DMX512** from the network, the NODE4 will continue to transmit its last received DMX512 data for three seconds. It then stops transmitting DMX512 and disables the the DMX512 line driver allowing moving lights and dimmers to reset or to let a Preset10 take control of the line.

Merging on the NODE4 is done automatically. Six network sources per port are allowed on the NODE4. This means that a single port on the NODE4 set for universe one can automatically merge six different sources which are generating universe one. In Streaming ACN mode, priorities of the stream are also taken into account. For example, the NODE4 will automatically merge six sources with the same priority. If a new source with a higher priority is received, the other sources will be rejected until the higher priority source has timed out. If a port is set up to input DMX512 in Streaming ACN mode, that port will be transmitted on the network with a priority of 100. This is the default priority for Streaming ACN.

Typical Layout



A typical network system will contain at least one console, one or more NODE4s, and an Ethernet switch. In the system shown above, the console is connected by an Ethernet cable to an Ethernet switch. An Ethernet cable is connected from the switch to each NODE4. Category 5e or higher cabling is required for 100Mbps operation in an Ethernet network.

Network Setup

There are a number of considerations when connecting and configuring a lighting control network. The first option to consider is whether the system IP addresses will be dynamically assigned by a DHCP server or if static assigned IP addresses will be used. Doug Fleenor Design's NODE4 is capable of either DHCP or static IP addressing schemes. Doug Fleenor Design recommends using static IP addresses in an entertainment lighting control network. In a static IP environment, the user will manually set the IP address of each unit in the network. Care must be taken to make sure that each NODE4 has the same subnet mask and that each unit has a unique IP address in that subnet. The NODE4 comes from the factory with a static IP in the range of 10.X.X.X, which is based on its MAC address. Note that when DHCP is enabled and no DHCP server is available (such as when physically connected to the console), the NODE4 will use its currently programmed static IP address. On loss of the Ethernet link (such as when the network cable is unplugged from the unit), the NODE4 will revert back to its programmed static IP. In a DHCP environment, IP address and Subnet Masks for the NODE4 are configured automatically from the DHCP server. Most routers have a built-in DHCP server.

The other major consideration is what network protocol to use. Doug Fleenor Design highly recommends the use of ANSI E1.31 Streaming ACN in networks for its scalability and higher performance characteristics. Streaming ACN has no restrictions on IP, whereas an Art-Net IP must be in the range 2.X.X.X or 10.X.X.X with a subnet of 255.0.0.0.

Other things to consider when designing and configuring a network.

- 1) Try not to mix network protocols (Do not use Art-Net and Streaming ACN in the same network if it can be avoided.)
- 2) When selecting of an Ethernet switch, a managed switch must be used. Most Ethernet switches now have broadcast storm control which must be disabled to allow entertainment lighting protocols to pass through.
- 3) Use the same subnet mask on all network devices, but be sure it is big enough to fit the number of devices on the network.
- 4) Doug Fleenor Design strongly recommends that lighting control networks should not be connected to the Internet. It is recommend that the lighting network is a completely separate network with no Internet access.
- 5) Be aware of the rules for Art-Net IP addresses. Art-Net requires the IP to be in the range of either 2.X.X.X or 10.X.X.X and the subnet must be 255.0.0.0. These must be followed for the NODE4 to inter-operate completely with other Art-Net Gear.
- 6) If there will be more than 100 network universes in a connected network, a managed Layer 3 network should be considered.

Limited Manufacturer's Warranty

Products manufactured by Doug Fleenor Design (DFD) carry a five-year parts and labor warranty against manufacturing defects. It is the customer's responsibility to return the product to DFD at the customer's expense. If covered under warranty, DFD will repair the unit and pay for return ground shipping. If a trip is necessary to the customer's site to solve a problem, the expenses of the trip must be paid by the customer.

This warranty covers manufacturing defects. It does not cover damage due to abuse, misuse, negligence, accident, alteration, or repair by other than by Doug Fleenor Design.

Most non-warranty repairs are made for a fixed \$50.00 fee, plus shipping.

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